REMARKS/ARGUMENTS

This Amendment is responsive to the Office Action mailed on November 27, 2007. Attached is a petition for a three-month extension of time.

In this Amendment, Claims 1, 5, and 7-12 are amended; Claims 13-14 are added; leaving Claims 1-14 pending and subject to examination. In order to advance prosecution of this Application, Applicants respond to each notation by the Examiner, and respectfully request reconsideration and favorable action in this case.

I.   Future Claim Objection under 37 CFR §1.75

The Office Action advises that Claims 11 and 12 will be objected to under 37 CFR § 1.75 as being substantial duplicative, should Claims 11 and 12 be found allowable. *Office Action*, page 2, paragraph 1. Claim 11 is amended to delete certain limitations. Claim 12 is amended to depend upon Claim 11 and to include the limitations deleted from Claim 11. Accordingly, Applicants respectfully request withdrawal of the claim objection under 37 CFR § 1.75.

II.   Claim Objections under 37 CFR § 1.75(a)

Claims 1 and 5 are objected to under 37 CFR § 1.75(a) as failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. *Office Action*, page 2, paragraph 2. Specifically, the Office Action objects to the term "(along)" in the limitation ,"isolating segments of vertex points (along) between planes normal to the curve proximate to the major axis of the colon from the thin version of the colon like surface," of Claim 1. *Office Action*, page 2, paragraph 4. The Office Action also objects to the term "smoothed version" in the limitation "computing a smoothed version of the centerline of the colon to approximate centerlines obtained by invasive colonoscopy," of Claim 5. *Office Action*, page 3, paragraph 1.

Claim 1 is amended to delete the term "(along)." Claim 5 is amended to replace "computing a smoothed version of the centerline of the colon to approximate centerlines

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obtained by invasive colonoscopy" with "smoothing the centerline of the colon." Accordingly, Applicants respectfully request withdrawal of the claim objections under 37 CFR § 1.75(a).

III.   Claim Rejection under 35 U.S.C. §101

Claims 1-12 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. Although Applicants disagree with the Examiner, Applicants have amended independent Claims 1 and 9-11 to expedite prosecution of the Application. As suggested by the Examiner on page 4, paragraph 1, independent Claims 1 and 9-11 have been amended to indicate that the algorithm is "embodied in a computer readable medium." Accordingly, Applicants respect withdrawal of the rejection under 35 U.S.C 101.

IV.   Section 102(b) Rejection

Claims 1-6 and 9-12 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,920,391 to Vining et al. (*"Vining et al."*). Applicants traverse this rejection for the reasons discussed below.

A.   **Amended Claim 1 is patentable because *Vining et al.* fails to teach or suggest every limitation of amended Claim 1**

To anticipate a claim, each and every element must be expressly or inherently described in the prior art reference being cited. *Verdegaal Bros. v. Union Oil Co. of California,* 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). MPEP § 2131.

Applicants respectfully submit that *Vining et al.* fails to teach or suggest the elements specifically recited in amended Claim 1. For example, *Vining et al.* fails to disclose, teach, or suggest "generating a shrunken version of the colon like surface utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view," or "isolating segments of vertex points between planes normal to the curve proximate to the major axis of the colon like surface from the shrunken version of the colon like surface."

1.   *Vining et al.* **fails to teach or disclose "generating a shrunken version of the colon like surface utilizing neighbors averaging of the three dimensional**

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>**position information for every vertex point in the original colon view," of Claim 1.**

The Office Action relies on the wireframe model to teach a new version of the colon like surface:

>generating a thin version of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex)

Office Action, page 5, paragraph 1.

Vining et al. discloses a wireframe model that is a polygonal mesh corresponding to an isosurface of the region of interest (e.g., an organ or portion of an organ):

>Returning to FIG. 1, once the region of interest has been segmented, an isosurface of the region of interest is created at step 37. The isosurface can be generated using a variant of a marching cube algorithm. The isosurface is then used to generate a wireframe model at step 38. ***The wireframe model comprises a polygonal mesh that corresponds to the surface of the region of interest.***

Vining et al., col. 7, lines 54-60 (emphasis added). See also *Vining et al.*, col. 5, lines 40-61. "An isosurface...is created by a computer from the volume of data based on a selected value or values of a physical property representing the selected region of interest." *Vining et al.*, abstract. That is, the wireframe model in *Vining et al.* represents the selected region of interest, not a shrunken version thereof. Thus, the wireframe model in *Vining et al.* does not to teach a shrunken version.

The Office Action relies on computing normal vectors at vertices of the wireframe model to teach generating a new version by utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view. *Id.*

Vining et al. discloses calculating normal vectors for each vertex of the wireframe model by averaging normal vectors of polygons in the wireframe model connected to that vertex:

> At step 40, a normal vector is calculated for each vertex in a the
> wireframe model. The direction of each normal vector is
> perpendicular to a plane that is tangent to the isosurface at each
> such vertex, typically pointing away from the object or away from
> the lumen of a body organ. The normal vectors at the respective
> vertices can be computed as the average of the normal vectors
> associated with each polygon connected to that vertex.

Vining et al., col. 8, lines 41-57. That is, *Vining et al.* discloses calculating normal vectors to

determine a normal vector at a vertex, not to generate a shrunken version. Thus, calculating

normal vectors does not teach generating a shrunk version using neighbors averaging of three

dimensional position information. Further, there are no other teachings or suggestions in *Vining*

et al. that a shrunken version of a colon like surface is generated by averaging three dimensional

positional information from neighbors.

Thus, *Vining et al.* fails to teach or suggest "generating a shrunken version of the

colon like surface utilizing neighbors averaging of the three dimensional position information for

every vertex point in the original colon view," as recited in Claim 1.

2.   *Vining et al.* **fails to teach or disclose "isolating segments of vertex points
between planes normal to the curve proximate to the major axis of the colon
like surface from the shrunken version of the colon like surface," of Claim 1,
as amended.**

The Office Action relies on grouping abnormal vertices on the wireframe model

into populations of vertices to teach isolating segments of vertex points between planes normal to

the curve proximate to the major axis of the colon like surface from the new version of the colon

like surface:

> isolating segments of vertex points (along) between planes normal
> to the curve proximate to the major axis of the colon from the thin
> version of the colon like surface (see figure 1, numeral 45; col. 10,
> lines 66-67; col. 11, lines 1-10 vertices on the wireframe model
> associated with abnormal structure are grouped into populations);

Office Action, page 5, paragraph 1.

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      Vining et al. discloses grouping vertices on the wireframe model that are associated with abnormal structure such as structure with abnormal wall thickness, abnormal shape, abnormal local convexity, or abnormal local curvature:

> At step 45, the vertices on the wireframe model associated with abnormal structure (i.e., having a combination of associated abnormal wall thickness and/or abnormal shape, such as abnormal local convexity and/or abnormal local curvature) are grouped into populations. The re-ordered connectivity matrices are used to determine if vertices associated with abnormal parameters are directly connected to other vertices that are also associated with abnormal parameters. Accordingly, each formed population represents a potential abnormal lesion. In addition, each population can be further analyzed and characterized by its size, dimensions, or other statistical quantities.
>
> Generally, the size of a population is indicated by the number of vertices which comprise the population. At step 46, those populations having a size below a predetermined minimal value are excluded from being considered abnormal. If the size of a population is sufficiently small, then the population is unlikely to represent a true lesion. Instead, the population more likely represents a normal aberration in the structure or image segmentation process. Accordingly, elimination of those populations having a size below a minimum value, decreases the occurrence of false positive findings.

Vining et al., col. 10, lines 66-col. 11, lines 10. For example, vertices representing a potential lesion may be grouped together. *Id.*

      First of all, the wireframe model does not teach a shrunken version of the colon like surface as explained above. Second, *Vining et al.* does not indicate that the groupings of vertices teach isolated segments of vertex points between planes normal to the curve approximate to the major axis of the colon like surface. In many cases, the groupings in *Vining et al.* include only a subset of the vertices between planes normal to the curve. For example, a grouping could represent a lesion on an upper surface of a cylindrical organ. Two normal planes to the curve proximate the major axis of the cylindrical organ that capture the lesion would also capture the lower surface of the cylindrical organ. Since the lesion is only on the upper surface,

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the grouping representing the lesion would not include the vertices on the lower surface of the cylinder. In this example, the grouping only includes a subset of the vertices between the planes normal to the curve. For this reason, groupings of abnormal vertices do not teach the isolated segments of vertex points between normal planes and grouping the abnormal vertices does not teach isolating the segments. Thus, *Vining et al.* fails to teach or suggest "isolating segments of vertex points between planes normal to the curve proximate to the major axis of the colon like surface from the shrunken version of the colon like surface," recited in Claim 1, as amended.

3.   ***Vining et al.* fails to teach or suggest "mapping the isolated segments of vertex points from the shrunken version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface," of Claim 1, as amended.**

As discussed above, *Vining et al.* fails to teach or suggest isolated segments of vertex points between planes normal to the curve proximate the major axis of the colon like surface. Thus, *Vining et al.* does not teach or suggest mapping of isolated segments. For this reason, *Vining et al.* fails to teach or suggest "mapping the isolated segments of vertex points from the shrunken version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface," recited in Claim 1, as amended.

Thus, *Vining et al.* fails to teach or suggest the elements specifically recited in independent amended Claim 1 and Claim 1 is allowable.

B.   Dependent Claim 2-6 are patentable.

Dependent Claims 2-6 are allowable based on their dependence on Claim 1 and further because they recites additional patentable distinctions over the cited references. For example, Claim 3 recites "computing a centerline of the colon utilizing the ring profile of the colon like surface."

C.   Independent Claims 9-12 are patentable.

Independent Claims 9-12 recite certain limitations substantially similar to those recited in independent Claim 1 and thus Claims 9-12 are allowable.

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Accordingly, Applicants respectfully request reconsideration and allowance of Claims 1-6, 9-12.

V.   Section 103(a) Rejections

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over anticipated by *Vining et al.* in view of U.S. 7,194,117 B2 to Kaufman et al. (*"Kaufman et al."*). Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Vining et al in view of Kaufman et al., and further in view of U.S. Patent No. 5,782,762 to Vining (*"Vining 2"*). Applicants traverse this rejection for the reasons discussed below.

As discussed above, *Vining et al.* fails to disclose, teach or suggest "generating a shrunken version of the colon like surface utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view," or "isolating segments of vertex points between planes normal to the curve proximate to the major axis of the colon like surface from the shrunken version of the colon like surface," "mapping the isolated segments of vertex points from the shrunken version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface," elements of amended Claim 1. *Kaufman et al.* and *Vining 2* also fail to teach these elements. Thus, *Vining et al.* fails to disclose, teach, or suggest the combination of elements specifically recited in Claims 7 and 8 whether *Vining et al.* is considered alone or in combination with *Kaufman et al.* or *Vining 2.*

Accordingly, Applicants respectfully request reconsideration and allowance of Claims 7 and 8.

VI.   New dependent Claims 13-15 are patentable.

Although the Examiner has not had the opportunity to reject Claims 13-15, Applicants submit that they are patentable over the cited references. Dependent Claims 13-15 are allowable based on their dependence on independent Claim 1 and further because they recite numerous additional patentable distinctions over the cited references.

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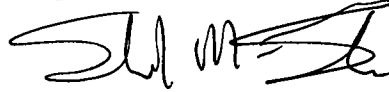Reply to Office Action of November 27, 2007

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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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